

CLAIMS

1. Automatic multi-function multi-needle sewing machine comprising upper sewing members (14) and lower sewing members (15) cooperating with each other so as to achieve
5 stitches (18) on a simple or padded fabric (11), with or without lining, characterized in that it also comprises at least an auxiliary supporting bar (19) cooperating with said sewing members (14, 15) and a plurality of accessory elements (28, 28a, 30, 37, 47, 51, 70) able to be
10 selectively associated with said supporting bar (19) by means of attachment means (50, 60) of a standardized type, said accessory elements (28, 28a, 30, 37, 47, 51, 70) being interchangeable with each other in order to achieve one or the other of at least the operations of multiple sewing,
15 application of accessories such as ribbons, trimmings, paillettes or strass, tapes, longitudinally or transversely to said fabric (11), or crimping.
2. Sewing machine as in claim 1, characterized in that at least some of said accessory elements (30, 37, 47, 51, 70)
20 comprise movement means (31, 40, 31a, 72).
3. Sewing machine as in claim 1 or 2, characterized in that said attachment means of a standardized type comprise a plurality of housings (20) made on an upper surface of said auxiliary supporting bar (19), and at least an attachment
25 part (60), made on each of said accessory elements (28, 28a, 30, 37, 47, 51, 70), in order to be disposed and attached in a corresponding one of said housings (20).
4. Sewing machine as in claim 1 or 2, characterized in that said attachment means of a standardized type comprise a
30 linear guide (50) provided on said supporting bar (19) and able to allow the transverse sliding of at least a type of said accessory elements (51) with respect to said auxiliary supporting bar (19).

5. Sewing machine as in any claim hereinbefore, characterized in that below said auxiliary supporting bar (19) means (21) are provided inside which a toothed element (23) to transmit motion is able to slide.
- 5 6. Sewing machine as in claim 5, characterized in that at the ends of said auxiliary supporting bar (19) command, guide and return means are provided for said toothed element (23).
7. Sewing machine as in claim 6, characterized in that it
10 comprises a command motor (26) controlled by a control unit (17), for the selective and programmable command of said toothed element (23).
8. Sewing machine as in claims 1 and 3, characterized in that said accessory elements comprise a plurality of
15 standard static feet (28, 28a) able to perform multiple stitches and ornamental designs on said fabric (11), and comprising said attachment part (60) to the auxiliary supporting bar (19) and at least a shaped part (61) disposed during use in proximity with said fabric (11) and
20 provided with a corresponding passage hole for the relative upper sewing member (14).
9. Sewing machine as in claims 2, 3 and 5, characterized in that said accessory elements comprise a plurality of robotized feet (30) able to apply strips (33), tapes (34 or
25 trimmings on said fabric (11), and each one comprising said attachment part (60) to the auxiliary supporting bar (19) and at least a supporting part for said movement means (31), said movement means comprising a toothed wheel (31) rotating idle and engaging with said toothed element (23).
- 30 10. Sewing machine as in claim 9, characterized in that said toothed wheel (31) comprises a cylindrical insert (32) provided with an axial hole (29) for said upper sewing member (14), and a plurality of holes and/or hollows (57,

58, 62) with different diameters and widths, disposed eccentric with respect to said axial hole (29), and through which said strips (33), and/or said tapes (34) to be applied pass.

5 11. Sewing machine as in claims 2, 3 and 5, characterized in that said accessory elements comprise a plurality of robotized feet (37) able to apply crimped tapes (36) onto said fabric (11), and each comprising said attachment part
10 (60) to the auxiliary supporting bar (19) and movement means comprising a toothed wheel (40) able to engage with said toothed element (23) and provided with a central hole (41) through which said upper sewing member (14) passes, and with a cam (42) able to move alternately a pad (43), said pad (43) being able to support a movable blade (45)
15 able to slide on a fixed blade (46) associated rigidly with said robotized foot (37).

12. Sewing machine as in claims 2, 3 and 5, characterized in that said accessory elements comprise a plurality of robotized feet (47) able to perform the crimping over the
20 whole width of said fabric (11), and each comprising said attachment part (60) to the auxiliary supporting bar (19) and movement means comprising a toothed wheel (40) able to engage with said toothed element (23) and provided with a central hole (41) through which said upper sewing member
25 (14) passes, and with a cam (42) able to move alternately a pad (43), said pad (43) being able to support a movable blade (45a) able to act on said fabric (11) to be crimped.

13. Sewing machine as in claims 2 and 3, characterized in that said accessory elements comprise a plurality of
30 robotized feet (70) able to apply paillettes (80) on said fabric (11), and each comprising said attachment part (60) to the auxiliary supporting bar (19) and movement means comprising a toothed wheel (72) able to engage with said

- toothed element (23) and provided with a central hole (73) through which said upper sewing member (14) passes, and with a cam (74) able to move alternately a pad (75), said pad (75) being able to support a movable blade (77) able to engage with a hole (82) of one of said paillettes (80) in order to determine the progressive advance thereof towards said toothed wheel (72) so as to stitch said paillette (80) onto said fabric (11) by means of the relative needle (14).
14. Sewing machine as in claim 13, characterized in that it comprises a positioning element conformed as a hook (86) able to center the hole (82) of the paillette (80) to be applied with the hole (73) of the toothed wheel (72) and hence in axis with the sewing needle (14).
15. Sewing machine as in claims 12 and 13, characterized in that it comprises a cutting assembly (92, 93, 94) of a rotary type and disposed in cooperation with the lower part of the hole (73) of said toothed wheel (72), able to cut the paillette (80) after it has been applied on the fabric (11) with respect to the feed strip (81).
16. Sewing machine as in claims 2, 4 and 5, characterized in that said accessory elements comprise a slider (51) able to apply tapes (48), ribbons or trimmings transverse to the direction of feed of said fabric (11), and said movement means comprise at least a toothed wheel (31a) able to engage with said toothed element (23), a device to cut the thread of the needle and a clamping device (52) able to selectively clamp the rotation of said toothed wheel (31a), in order to allow said slider (51) to be drawn along said linear guide (50).
17. Method to sew onto a simple or multi-layer fabric (11), with or without lining, for an automatic multi-function multi-needle sewing machine comprising at least upper sewing members (14) and lower sewing members (15)

cooperating with each other, characterized in that it provides to perform one or the other of at least the operations of multiple sewing, application of accessories such as ribbons, trimmings or tapes, paillettes or strass, longitudinally or transversely to said fabric (11), or crimping, by the selective assembly of one chosen from a plurality of accessory elements (28, 28a, 30, 37, 47, 51, 70), interchangeable with each other and all able to be mounted, by means of attachment means (50, 60), on an auxiliary supporting bar (19) cooperating with said sewing members (14, 15).

18. Method as in claim 17, characterized in that a first static type of said accessory elements (28, 28a) is used to perform multiple stitches with an unlimited number of ornamental designs or patterns on simple, multi-layer or padded fabrics (11), fed continuously from rolls.

19. Method as in claim 17, characterized in that a second robotized type of said accessory elements (30) is used to perform applications of stitches of strip (33), tapes (34) or trimmings on simple, multi-layer or padded fabrics (11), fed continuously from rolls.

20. Method as in claim 17, characterized in that according to the type of strip (33), tape (34) or trimming to be applied, said accessory elements (30) are positioned and moved automatically to a working position, with respect to said upper sewing members (14), such as to fix said strip (33) to said fabric (11), without said needle (14) passing through said strip (33), or such as to fix said tape (34) to said fabric (11) with stitches always in the center of said tape (34).

21. Method as in claim 17, characterized in that a third robotized type of said accessory elements (70) is used to perform applications of stitches of paillettes or strass

(80) on simple, multi-layer or padded fabrics (11), fed continuously from rolls.

22. Method as in claim 21, characterized in that it provides a first step of selective feed of a strip (81) of
5 said paillettes (80) by means of the alternate movement of a pointed element (77) whose tip (77a) engages in the hole (82) of the first of said paillettes (80), a second step of positioning said paillette (80) in axis with the sewing
10 needle (14) by means of a hook-type positioning element (86), a third step of sewing the paillette (80) onto the fabric (11) and a fourth step of cutting the first paillette (80) with respect to the feed strip (81) by means
15 of a rotating cutting element disposed in proximity with the sewing position and able to be inserted into the throat between two adjacent paillettes (80).

23. Method as in claim 17, characterized in that a fourth robotized type of said accessory elements (37) is used to apply crimped tapes (36) on said fabric (11)

24. Method as in claim 23, characterized in that said
20 accessory elements (37) alternately thrust forwards said tapes (36) by means of a movable blade (45), making them slide on a fixed blade (46) so as to crimp them before they are sewn by said upper sewing members (14).

25. Method as in claim 17, characterized in that a fifth robotized type of said accessory elements (47) is used to perform crimping over the whole width of said fabric (11).

26. Method as in claim 17, characterized in that a sixth type of said accessory elements (51) is used to apply tapes
30 (48), ribbons or trimmings, disposed transverse to the direction of advance of said fabrics (11).

27. Method as in claim 26, characterized in that the functioning of each of said accessory elements of the sixth type (51) provides at least the following operating steps:

- a first step, wherein the accessory element is stationary at a first end of said auxiliary supporting bar (19) and said tape (48) is positioned behind one of said upper sewing members (14a) with respect to the side on which said fabric (11) enters;
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- a second step wherein said fabrics (11) are made to advance and, by means of the stitching made with said upper sewing members (14a), said tape (48) is fixed to said fabric (11);
- 10 - a third step wherein said fabric (11) is stopped and said tape (48) is taken to the left of said upper sewing member (14a) with respect to the side on which said fabric (11) enters;
- a fourth step wherein the accessory element (51) is drawn
15 transversely along said auxiliary supporting bar (19) until it covers all the width of said fabric (11), so as to lay said tape (48) transversely on said fabric (11);
- a fifth step wherein said accessory element (51) is at a second end of said auxiliary supporting bar (19) and said
20 tape (48) is behind said upper sewing member (14a) with respect to the side on which said fabric (11) enters;
- a sixth step wherein said fabric (11) is made to advance and, by means of the stitching made with said upper sewing members (14a), said tape (48) is fixed to said fabric (11);
- 25 - a seventh step wherein said fabric (11) is stopped and said tape (48) is taken to the right of said upper sewing member (14a) with respect to the side on which said fabric (11) enters; and
- an eighth step wherein said accessory element (51) is
30 drawn transversely along said auxiliary supporting bar (19) until it covers the whole width of said fabric (11), so as to lay said tape (48) transversely on said fabric (11).